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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/533,560
Filing Date: May 20, 2005
Appellant(s): ZOBL ET AL.

Werner Stemer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07 January 2008 appealing from the Office action mailed 06 July 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

This appeal involves claims 8-15.

Claims 13-15 were inadvertently left out of the statement of the rejection in the previous Office Action, however the limitations of these claims were specifically addressed on pages 3 and 5 of that Office Action. In addition, the Office Action Summary (PTOL-326) of the previous Office Action listed claims 8-15 as rejected, as did the Advisory Action (PTOL-303) mailed on 22 October 2007.

(4) Status of Amendments After Final

The amendment after final rejection filed on 08 October 2007 has not been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: the claims to be reviewed for obviousness are claims 8-15, not 8-12 as stated by the Applicant.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,660,420	Yoshida	12-2003
6,517,338	Koga	2-2003
5,733,682	Quadakkers	3-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 8-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US Patent 6,660,420) in view of Koga (US Patent 6,517,338) and Quadakkers (US Patent 5,733,682).

Yoshida discloses a method for forming a separator (i.e., an interconnector) for a fuel cell comprising a two step pressing operation. The process includes pressing the powder to a shape similar to a final desired shape to create a preliminary molded member, then further pressing the preliminary molded member to create a molding of the final desired shape (Col 4 lines 12-16). The separator is generally plate-like with a plurality of knob like protrusions (See Fig. 1). While the angle of inclination is not specifically given, it appears from the drawings to be approximately 90° (see Figs. 3, 4B

and 6). Yoshida further discloses that the dimensions of the preliminary molded member in the direction of the molding pressure (i.e., the height of the knobs) are about 1 to 2 times the dimensions of the final molded member.

Yoshida does not disclose that in the second pressing steps the angle of inclination is increased to between 95° and 170°.

Koga teaches a method of pressing a powder into a desired shape using a set of molding dies to create a fuel cell separator having a number of protrusions extending from the base plate of the separator. Koga discloses that the dies include holes used to form the protrusions which could have an inside wall that is not perpendicular to the other surface, but is instead inclined at a given angle so that the diameter of a protrusion would decrease as it moved away from the base plate (Col 5 lines 7-21). The angle of inclination formed between the base plate and the protrusion is stated as preferably being between 91° and 100° (Col 5 lines 14-15), and appears to be approximately 105° in Fig. 6, however Koga further notes that inclined walls of the die need only to have a inclined (i.e., not perpendicular) inside wall, and that any inclination or shape (i.e., the walls do not need to be linear) would work (Col 5 lines 18-21).

Yoshida and Koga do not disclose that the powder used be selected from the group consisting of metallic and ceramic materials, and specifically be an alloy having at least 20 wt% of chromium (Cr) component (claim 13), or that the alloy contain Cr, iron (Fe) and one or more metallic or ceramic alloy of at most 40 wt% (claim 14).

Quadakkers discloses a bipolar plate (i.e., interconnector or separator) for a fuel cell and a metal and ceramic composition of the same which must be sintered to obtain

the final product. One composition specifically disclosed by Quadakkers include (all percentages given are based on weight) 20% Cr, 5% aluminum (Al), 0.5% Yttrium Oxide (Y_2O_3), balance (74.5%) Fe, this composition is said to have superior corrosion resistance (Col 2 lines 1-3, 13-14, see also claim 6).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of forming a fuel cell separator by a two step pressing process as taught by Yoshida with the second pressing step reducing oversized knobs down to a final desired size, with the fuel cell separator pressing process taught by Koga where the angle of inclination between the base plate and the knob-like protrusion is greater than 90°, since Koga discloses that having such an angle makes it easier to release the pressed piece from the die (Col 5 lines 20-21).

It would have been further obvious to one of ordinary skill in the art at the time of invention by applicant to use the composition taught by Quadakkers and discussed above in the process of Yoshinda and Koga since Quadakkers discloses that such a composition is effective as a fuel cell separator and creates a separator with increased corrosion resistance. One would have been motivated to do so since all three references are directed toward an interconnector of a fuel cell, and Yoshida and Koga discuss the advantages of using near final shape press molding to create the interconnector, while Quadakkers discloses the advantages of using the material discussed above in creating such an interconnector.

Referring to claim 11, Yoshida and Koga do not specifically disclose that the angle of inclination between the base plate and the knob-protrusions after the first

pressing be between 110° and 130°, and be increased by the second pressing to between 115° and 160°. However, it would have been obvious to one of ordinary skill in the art at the time of invention by applicant that the angle of inclination taught by Koga, as discussed above, would include angles in both of those ranges. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga

Referring to claim 12, Yoshida and Koga do not specifically disclose a pre-sintering step after the first pressing stage. It is well known in the art that when a powder is pressed which include known additives to assist in forming the mold (such as a binder or lubricant), that these materials should be burned off prior to sintering by heating the molding to a temperature at which those additives volatilize and are thus removed from the molded piece. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant that when a powder which uses additives is used to form the molding, that a pre-sintering step be used to remove those additives after the piece is molded and before the piece is finally sintered.

Referring to claim 15, Yoshida, Koga and Quadakkers are relied upon as discussed above, further they all discus where the molding produced is an interconnector or separator for a fuel cell.

(10) Response to Argument

Applicant argues that one of ordinary skill in the art would not have been motivated to combine Yoshida and Koga with Quadakkers since Yoshida and Koga both use a graphite powder which is pressed with a thermosetting resin (which is easy to press and does not require sintering), while Quadakkers uses a metallic powder (which is difficult to press and requires sintering.

However, one of ordinary skill in the art would have recognized that Yoshida, Koga and Quadakkers were all directed to a method of making a fuel cell separator or interconnector from a powder material. One of ordinary skill in the art, given the teachings of these references, would understand the different advantages and disadvantages of each powder (such as the force required for pressing, or if after forming the body would need to be sintered) and be able to adjust the process in order to take these factors into account.

Applicant further argues that one of ordinary skill in the art would not have combined the cited references because Quadakkers discloses that when powder is used metal injection molding (MIM) or wet powder pouring (WPP) were the only methods available to one of ordinary skill in the art.

This is not what Quadakkers says however. Quadakkers states that piece may be made "by a process yielding a shape close to the final form (near-net-shape-

processing) by powder metallurgical methods (MIM, WPP)" (Col 3 lines 36-38). Here Quadakkers clearly states that the piece may be made by powder metallurgical methods, and gives as examples MIM and WPP. At no point does Quadakkers say that those are the only two powder metallurgical methods available or that other methods would not be suitable. Therefore, one of ordinary skill in the art would have found it obvious to use the powder of Quadakkers in other powder forming methods, such as those in Yoshida and Koga.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Russell J Kemmerle/

Examiner, Art Unit 1791

/Steven P. Griffin/

Supervisory Patent Examiner, Art Unit 1791

Conferees:

/Steven P. Griffin/

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TQAS, TC 1700